Project Learning Tree's ***Exploring Environmental Issues: Municipal Solid Waste***

Correlation of Activities to the California Science Content Standards Grades 6–12

August 2002

California Environmental Protection Agency
Integrated Waste Management Board

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The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, Flex Your Power and visit www.consumerenergycenter.org/flex/index.html.

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Material in this guide, except for *Project Learning Tree* correlations, is extracted from the following document published by the California State Board of Education:

> *Science Content Standards for California Public Schools, Kindergarten Through Grade Twelve*

For more information about this and other Project Learning Tree curricula, contact the American Forest Foundation, 1111 19th Street, NW, Suite 780, Washington, D.C. 20036, (202) 463-2462, (Web site: www.plt.org). In California, call Kay Antunez, (916) 653-7958 (e-mail: kay.Antunez@fire.ca.gov).

For training workshops on Project Learning Tree's *Exploring Environmental Issues: Municipal Solid Waste*, contact CIWMB's Office of Integrated Environmental Education at (916) 341-6769.

Grade 6—Focus on Earth Science

Heat (Thermal Energy) (Physical Science)

3. Heat moves in a predictable flow from warmer objects to cooler objects until all objects are at the same temperature. As a basis for understanding this concept, students know:

B. When fuel is consumed, most of the energy released becomes heat energy.

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Waste-to-Energy

Ecology (Life Science)

5. Organisms in ecosystems exchange energy and nutrients among themselves and with the environment. As a basis for understanding this concept, students know:

A. Energy entering ecosystems as sunlight is transferred by producers into chemical energy through photosynthesis, and then from organism to organism in food webs.

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Composting

A. Over time, matter is transferred from one organism to others in the food web, and between organisms and the physical environment.

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Resources

6. Sources of energy and materials differ in amounts, distribution, usefulness, and the time required for their formation. As a basis for understanding this concept, students know:

A. The utility of energy sources is determined by factors that are involved in converting these sources to useful forms and the consequences of the conversion process.

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B. Different natural energy and material resources, including air, soil, rocks, minerals, petroleum, fresh water, wildlife, and forests, and classify them as renewable or nonrenewable.

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Introduction to Municipal Solid Waste: The Waste Stream
Recycling and Economics

C. Natural origin of the materials used to make common objects.

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Investigation and Experimentation

7. Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the

other three strands, students should develop their own questions and perform investigations. Students will:

A. Develop a hypothesis.

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B. Select and use appropriate tools and technology (including calculators, computers, balances, spring scales, microscopes, and binoculars) to perform tests, collect data, and display data.

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C. Construct appropriate graphs from data and develop qualitative statements about the relationships between variables.

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D. Communicate the steps and results from an investigation in written reports and verbal presentations.

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E. Recognize whether evidence is consistent with a proposed explanation.

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Grade 7—Focus on Life Science

Investigation and Experimentation

7. Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations. Students will:

A. Select and use appropriate tools and technology (including calculators, computers, balances, spring scales, microscopes, and binoculars) to perform tests, collect data, and display data.

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B. Utilize a variety of print and electronic resources (including the World Wide Web) to collect information as evidence as part of a research project.

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C. Communicate the logical connection among hypothesis, science concepts, tests conducted, data collected, and conclusions drawn from the scientific evidence.

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E. Communicate the steps and results from an investigation in written reports and verbal presentations.

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Grade 8—Focus on Physical Science

Reactions

5. Chemical reactions are processes in which atoms are rearranged into different combinations of molecules. As a basis for understanding this concept, students know:

A. Reactant atoms and molecules interact to form products with different chemical properties.

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C. Chemical reactions usually liberate heat or absorb heat.

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E. How to determine whether a solution is acidic, basic or neutral.

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Investigation and Experimentation

9. Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations. Students will:

A. Plan and conduct a scientific investigation to test a hypothesis.

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E. Construct appropriate graphs from data and develop quantitative statements about the relationships between variables.

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Grades 9–12

Standards without asterisks represent those that all students are expected to achieve in the course of their studies. Standards with asterisks represent those that all students should have the opportunity to learn.

Chemistry

Chemical Thermodynamics

7. Energy is exchanged or transformed in all chemical reactions and physical changes of matter. As a basis for understanding this concept, students know:

B. Chemical processes can either release (exothermic) or absorb (endothermic) thermal energy**.**

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Biology/Life Sciences

Ecology

6. Stability in an ecosystem is a balance between competing effects. As a basis for understanding this concept, students know:

A. Biodiversity is the sum total of different kinds of organisms, and is affected by alterations of habitats**.**

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B. How to analyze changes in an ecosystem resulting from changes in climate, human activity, introduction of non-native species, or changes in population size**.**

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D. How water, carbon, and nitrogen cycle between abiotic resources and organic matter in the ecosystem and how oxygen cycles via photosynthesis and respiration**.**

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E. A vital part of an ecosystem is the stability of its producers and decomposers**.**

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F. At each link in a food web, some energy is stored in newly made structures but much is dissipated into the environment as heat and this can be represented in a food pyramid**.**

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Investigation and Experimentation

1. Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other four strands, students should develop their own questions and perform investigations. Students will:

A. Select and use appropriate tools and technology (such as computer-linked probes, spreadsheets, and graphing calculators) to perform tests, collect data, analyze relationships, and display data**.**

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C. Identify possible reasons for inconsistent results, such as sources of error or uncontrolled conditions**.**

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D. Formulate explanations using logic and evidence.

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F. Distinguish between hypothesis and theory as science terms**.**

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L. Analyze situations and solve problems that require combining and applying concepts from more than one area of science.

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M. Investigate a science-based societal issue by researching the literature, analyzing data, and communicating the findings. Examples include irradiation of food, cloning of animals by somatic cell nuclear transfer, choice of energy sources, and land and water use decisions in California.

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